

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



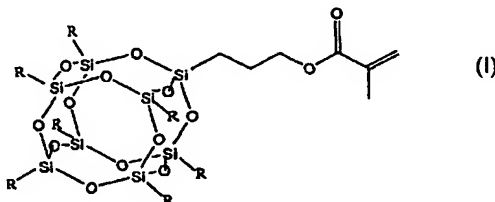
(43) International Publication Date
22 January 2004 (22.01.2004)

PCT

(10) International Publication Number
WO 2004/007582 A3

- (51) International Patent Classification⁷: **B32B 17/06**, 25/20, C09J 143/04
- (21) International Application Number: PCT/US2003/022162
- (22) International Filing Date: 15 July 2003 (15.07.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/396,153 15 July 2002 (15.07.2002) US
60/399,633 30 July 2002 (30.07.2002) US
- (71) Applicants (for all designated States except US): UNIVERSITY OF VIRGINIA PATENT FOUNDATION [US/US]; 1224 West Main Street, Suite 1-110, Charlottesville, Va 22903 (US). JAMES MADISON UNIVERSITY [US/US]; MSC 5728, MAW Suite 22B, Harrisonburg, VA 22807 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): AUGUSTINE, Brian, H. [US/US]; 201 East Bank Street, Bridgewater, VA 22812 (US). LANDERS, James, P. [US/US]; 633 Nettie Court, Charlottesville, VA 22903 (US). FERRANCE, Jerome, P. [US/US]; 113 Lupine Lane, Charlottesville, VA 22911 (US). POLEFRONE, Joy [US/US]; 2324 Fontaine Avenue, Charlottesville, VA 22903 (US). HUGUES, W., Christopher [US/US]; 815 Oak Hill Drive, Harrisonburg, VA 22801 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report: 25 March 2004
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: HYBRID POLYMERS FOR FUNCTIONAL TUNING OF MICROFLUIDIC DEVICE SURFACES



(57) Abstract: The present invention is directed to improved microdevices and methods of manufacturing such devices. More particularly the present invention is directed to the use of a compound having the general structure (formula (I)): wherein R is selected from the group consisting of C₁-C₆ alkyl, C₂-C₆ alkenyl, C₂-C₆ alkynyl, C₃-C₈ cycloalkyl, and C₅-C₆ aryl for bonding silica based substrates to plastic substrates or to other silica based substrates. In addition the polymer can be used to coat microchannels to enhance the physical properties of the microdevice.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/22162

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : B32B 17/06, 25/20; C09J 143/04
US CL : 428/429, 447, 522; 156/329, 332; 427/2.25, 387

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 428/429, 447, 522; 156/329, 332; 427/2.25, 387

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,510,257 A (LEWIS et al.) 09 April 1985 (09.04.1985), Figure 3.	1-35
A	US 6,326,083 B1 (YANG et al.) 04 December 2001 (04.12.2001), column 2, lines 10-25.	1-35
P	US 2002/0182541 A1 (GONSALVES) 05 December 2002 (05.12.2002), paragraph [0050].	1-35
A		
P	US 6,576,345 B1 (VAN CLEEMPUT et al.) 10 June 2003 (10.06.2003), column 3, lines 5-57.	1-35
A		
P	US 6,586,548 B2 (BONAFINI, JR. et al.) 01 July 2003 (01.07.2003), column 2, lines 15-51.	1-35
A		



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

14 January 2004 (14.01.2004)

Date of mailing of the international search report

05 FEB 2004

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

Jeffrey B. Robertson

Jean From
Paralegal

Telephone No. (703) 308-0661

INTERNATIONAL SEARCH REPORT

PCT/US03/22162

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
T — A	US 6,653,365 B2 (JIA) 25 November 2003 (25.11.2003), column 2, lines 1-10.	1-35

INTERNATIONAL SEARCH REPORT

PCT/US03/22162

Continuation of B. FIELDS SEARCHED Item 3:

EAST search, search terms: polyhedral, POSS, oligosilsesquioxane, polysilsesquioxane, film, coat, coating, coated, microfluidic device, microchannel, inlet port, methacrylate, acrylate, adhesive